# Effect of Mating Duration on Oviposition Rate and Hatchability of the Indian Tasar Silk Moth *Antheraea mylitta* (Saturniidae) in Different Seasons

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**Abstract.** Production of viable eggs in the tasar silk insect *Antheraea* sp. is influenced by the mating activity. Mating durations from 1 to 12 hours show an increasing trend in the hatchability of eggs up to 5 hours and little change thereafter during all the three rearing seasons, i.e., Rainy, Autumn and Winter. Significant variation in hatchability of eggs between mating durations has been observed. However, oviposition rate in *A. mylitta* does not show significant variation with increase in mating duration.

## Introduction

The Indian tropical tasar silk moth *Antheraea mylitta* (Drury) (Lepidoptera: Saturniidae) is semidomesticated and is economically important because of its commercial exploitation for tasar silk. The larvae are reared on the primary food plants, Asan (*Terminalia tomentosa* Wt & Arn) (Combretaceae) and Arjun (*Terminalia arjuna,* Wt & Arn) ( Combretaceae) in different seasons, i.e., Rainy (July-August), Autumn (September- October) and Winter (November-December). The larvae possess five instars and after the fifth instar enter the pupal stage by spinning a silk cocoon. The cocoons are usually preserved in a specially designed house called 'grainage'. Before each rearing season, the moths emerge from the cocoons and males and females mate at random. Mating continues for a period of 10-12 hours (Jolly *et al*, 1974). Females lay mature eggs just after mating. Inadequate male moth population in grainages is a major factor affecting production of viable eggs for rearing, making it necessary to use mated males for second matings. Little literature is available on the effect of duration of mating on the oviposition rate and production of viable eggs, and this investigation was carried out to determine a suitable time range for effective mating in *A. mylitta.*

## Material and Methods

One thousand healthy, freshly emerged moths of both sexes were selected at random in equal proportions during each rearing season. The moths were allowed to mate. A total of 240 couplings were randomly selected from them and divided into 12 groups, with 20 couplings each. The moths in different groups were allowed to mate in separate cages for durations ranging from 1 to 12 hours, after which the moths were decoupled physically. Eggs laid by the mated females were collected,

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counted and kept under laboratory conditions until hatching. The hatching percentage was recorded and analysed statistically for the ANOVA. The investigation was carried out at the State Sericultural Research Station, Baripada, Orissa, India during all the three rearing seasons, i.e., Rainy, Autumn and Winter of 1990.

## Results

The mean oviposition rate and hatchability of *A. mylitta* at different mating durations are illustrated in Table 1. The mean oviposition rate at different mating durations shows little variation during all the three rearing seasons. One way ANOVA test shows that the variation in oviposition rate at different mating durations is not significant. However the oviposition rate of *A. mylitta* between seasons was found to be highly significant ($P<0.05$, $F = 247.26$). The hatchability of eggs laid by mated female moths exhibits an increasing trend from one hour mating duration to five hours and shows little variation thereafter during all the three rearing seasons. One way ANOVA tests of data between durations of mating exhibit a significant difference in hatchability of eggs ($P<0.05$, $F = 5.298$). However, the variation in the hatchability of eggs of *A. mylitta* between seasons was not significant.

## Discussion

Narayanan *et al.* (1964) have reported that in the mulberry silk moth (*Bombyx mori* Linn.) 1 to 2 hours of mating is enough for normal oviposition. Behura and Panda (1978) have further observed that 4 hours of copulation were sufficient for normal oviposition in the eri silk moth *Samia ricini* Hutt. Shahi *et al.* (1979) reported an increase in the oviposition rate of *Dysdercus koenigii* Fabr. (Hemiptera: Pyrrhocoridae) with increase in mating duration. However, the present investigation indicates that the oviposition rate does not seem to be much influenced by the durations of mating.

In *A. mylitta* the hatchability of eggs was found to increase with an increase in mating duration up to 5 hours during all seasons and shows little change by further increase in mating duration. This indicates that 4-5 hours of mating is optimal for normal oviposition in *A. mylitta.* The present finding corroborates the earlier reports by Narayanan and Jadav (1964) and Gajare (1978) that maximum hatchability of eggs in *B. mori* occurred after 4 hours of mating. However, Rau and Rau (1913) have reported that in the moth *Cecropia* sp. 3 hours of mating are sufficient for normal fertility of eggs and further increase in mating duration is a waste of valuable time and vitality. Further, Jolly *et al.* (1974) observed that 1-2 hours of copulation are sufficient for normal hatchability of *A. mylitta* eggs. Punitham *et al.* (1987) reported that an increase in mating duration of *B. mori* from 3 hours to 9 hours enhanced the hatching percentage of eggs from 83% to 97% . In the present study the hatchability of eggs of *A. mylitta,* though significant between durations of mating, does not show much variation after 5 hours of mating.

The oviposition rate in *A. mylitta* shows significant variations between seasons. Davis (1965) has remarked that the oviposition variation is correlated to the activation of corpus allatum. Gillot and Friedel (1977) have

Table 1. Mean values of oviposition rate and percent hatchability ± Standard deviation of *A. mylitta* at different mating durations in different seasons during 1990.

| Duration of mating. (hrs.) | Season-wise ovipoistion rate (OR) and Percent Hatchability (H) | | | | | |
|---|---|---|---|---|---|---|
| | Rainy Season | | Autumn Season | | Winter Season | |
| | OR | H | OR | H | OR | H |
| 1 | 198.3 ± 9.4 | 54.3 ± 5.3 | 204.8 ± 8.2 | 63.3 ± 4.6 | 208.8 ± 7.0 | 62.6 ± 4.8 |
| 2 | 194.6 ± 7.8 | 57.6 ± 4.9 | 201.6 ± 9.1 | 68.5 ± 4.5 | 206.7 ± 8.4 | 69.8 ± 3.7 |
| 3 | 195.8 ± 8.3 | 68.1 ± 5.2 | 203.2 ± 8.8 | 71.4 ± 3.7 | 209.3 ± 9.3 | 77.4 ± 3.5 |
| 4 | 195.5 ± 8.7 | 75.8 ± 4.4 | 202.7 ± 8.2 | 80.7 ± 3.4 | 208.4 ± 8.6 | 86.2 ± 3.3 |
| 5 | 196.1 ± 8.1 | 76.7 ± 4.6 | 204.5 ± 8.7 | 81.4 ± 3.6 | 211.6 ± 7.9 | 87.2 ± 4.1 |
| 6 | 195.4 ± 9.1 | 76.4 ± 4.8 | 200.1 ± 8.1 | 80.2 ± 3.2 | 207.2 ± 8.5 | 87.7 ± 3.8 |
| 7 | 197.0 ± 8.6 | 75.2 ± 4.4 | 202.9 ± 9.2 | 80.4 ± 3.6 | 209.9 ± 8.8 | 85.6 ± 3.5 |
| 8 | 196.2 ± 9.3 | 76.8 ± 4.7 | 203.3 ± 7.8 | 81.9 ± 3.7 | 210.5 ± 8.6 | 87.1 ± 3.7 |
| 9 | 194.4 ± 8.2 | 74.3 ± 4.6 | 201.4 ± 9.1 | 80.6 ± 3.3 | 208.1 ± 9.2 | 86.9 ± 3.6 |
| 10 | 195.7 ± 7.8 | 76.1 ± 4.8 | 204.0 ± 8.3 | 81.5 ± 3.9 | 209.2 ± 8.4 | 86.2 ± 3.4 |
| 11 | 198.6 ± 8.8 | 75.6 ± 4.2 | 202.7 ± 8.7 | 81.4 ± 3.4 | 207.7 ± 8.7 | 87.4 ± 3.3 |
| 12 | 197.2 ± 8.1 | 74.3 ± 4.4 | 203.4 ± 8.3 | 80.2 ± 3.2 | 211.4 ± 8.8 | 86.5 ± 3.7 |

suggested that the increase in egg production might be due to secretion of fecundity-enhancing substances by male insects at the time of mating. Significant variation in the oviposition rate of *A. mylitta* between seasons may be attributed to the differential effects of the above factors during the three rearing seasons. The influence of seasonal factors on the reproductive behavior in *A. mylitta* needs further investigation.

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